

### REMARKS

Reconsideration and allowance of the subject application are respectfully requested.

Claims 1-3 and 5-26 are pending in the application, with Claims 1, 10, 18 and 25 being the independent claims. Non-elected Claims 27-35 are cancelled herein without prejudice to or disclaimer of their subject matter.

Claims 1 and 10 are amended herein to more clearly recite their subject matter. Support for these amendments may be found in the specification at least at page 14, lines 16-21 and page 16, lines 7-14. Claims 3, 7, 14, 18 and 25 are amended herein to improve their form. It is submitted that no new matter has been added by the amendments herein.

Applicant gratefully acknowledges that Claims 10 and 26 have been allowed. It is submitted that they remain in condition for allowance. Applicant thanks the Examiner for the indication that Claims 2 and 7-9 contain allowable subject matter. These claims have not been rewritten in independent form as suggested in the final Office Action dated November 5, 2003, since it is believed that Claim 1, from which they depend, is also in condition for allowance, as explained more fully below.

Claims 1 and 3 were rejected under 35 U.S.C. § 102(e) over Shirakawa et al. (U.S. Patent No. 6,499,899). Claims 5 and 6 were rejected under 35 U.S.C. § 103(a) over Shirakawa et al. Reconsideration and withdrawal of these rejections are respectfully requested.

Before addressing the merits of the rejections, Applicants believe it will be helpful to review some features and advantages of the present invention. The present invention, as recited in amended Claim 1, relates to a semiconductor device having an optical transmission region for transmitting a light signal and a light receiving part for converting the light signal propagating through the optical transmission region to an electrical signal. The optical transmission region comprises a two-dimensional waveguide layer capable of propagating the light signal in a plurality of directions. The light receiving part is embedded in the optical transmission region such that the light receiving part can receive the light signal propagating within a plane of the two-dimensional optical waveguide layer.

The present invention, as recited in amended Claim 10, also relates to an optoelectronic board comprising at least two layers consisting of a first layer and a second layer. The first layer includes an electronic device, an optical device and an electric wiring for coupling the electric and optical devices. The second layer includes a two-dimensional optical waveguide capable of propagating a light signal in a plurality of directions. The optical device has a light receiving part for receiving the light signal waveguided through the two-dimensional optical waveguide. The light receiving part is embedded in the two-dimensional optical waveguide such that the light receiving part can receive the light signal propagating within a plane of the two-dimensional optical waveguide.

In the present invention, light signals are propagated in a plurality of directions within the plane of the two-dimensional optical waveguide by using the claimed two-dimensional optical waveguide layer capable of propagating light signals. Moreover,

EMI (Electro Magnetic Interference) generated when only electrical wiring is used can be reduced (see page 16, line 26 of the specification). Also, since the light receiving part is embedded in the two-dimensional optical waveguide, light signals can be received from all directions (see page 16, line 26 to page 17, line 2 of the specification). Therefore, the direction dependency of light-receiving sensitivity can be reduced (see page 4, lines 10-12 of the specification). In Applicant's view, the cited reference does not teach or suggest all the features of the claimed invention.

Shirakawa et al. discloses a method of assembling an optical connector including a light emitting module and a light receiving module. It discloses, referring to Fig. 1, that FOT 6 and 7 (FOT is a fiber optical transceiver, also referred to as an optical element module (light emitting or light receiving module)) have molded portions 49 and 51, respectively, which are fitted into FOT casing 8. (See column 8, lines 1-50.) It also discloses that an optical fiber 84 is incorporated into the FOT casing 8. (See column 10, lines 4-8.)

The Examiner takes the position that the molded portion 51 serves as a two-dimensional optical waveguide layer allowing the embedded light-receiving element to receive light propagating within a plane of the molding without any directional dependence. In Applicant's view, however, the molded portion 51 of Shirakawa et al. functions not as the waveguide but as protection for the light receiving element (FOT). (See column 8, lines 36-37.) Shirakawa et al. also discloses (column 8, lines 30-34) that the molded portion 51 is made of a material capable of transmitting light and preferably has the same refractive index as that of the plastic optical fiber. Applicant takes this to mean

that the molded portion 51 is not a portion (like the waveguide of the present invention) for propagating light signals, but a portion that protects the light-receiving element (FOT) and merely transmits light between the FOT and the optical fiber 84.

Applicant further submits that the waveguide of Shirakawa et al. is different from, and therefore does not teach or suggest, the two-dimensional optical waveguide of the present invention, which is described at page 14, lines 16-21 of the specification.

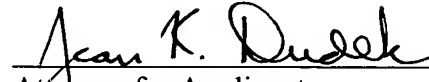
Applicant therefore concludes that Shirakawa et al. does not teach or suggest the claimed invention, and it is respectfully requested that the Section 102 and 103 rejections be withdrawn.

Applicant submits that the present invention is patentably defined by independent Claims 1, 10, 18 and 25. The dependent claims are allowable for the reasons given with respect to their respective independent claims and because they recite features which are patentable in their own right. Individual consideration of the dependent claims is respectfully solicited.

Applicant submits that this application is in condition for allowance. Favorable consideration, withdrawal of the rejections set forth in the Office Action, and an early Notice of Allowance are respectfully requested.

Applicant's attorney, Damond E. Vadnais, may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

  
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